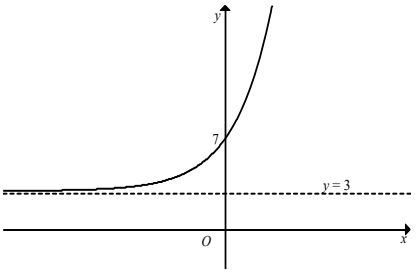
Question	Answer	Marks	Partial Marks
3	Uses $b^2 - 4ac$ oe: $(k+5)^2 - 4k(-4)$ [* 0, where * could be = or any inequality sign]	**M1**	
	Forms a correct 3-term expression: $k^2 + 26k + 25$	**A1**	
	Factorises $k^2 + 26k + 25$ or solves $k^2 + 26k + 25 = 0$ oe	**M1**	**dep** on first **M1**, **FT** *their* 3-term quadratic in k
	Correct critical values $-1, \quad -25$ soi	**A1**	
	$k \leqslant -25$, $k \geqslant -1$	**A1**	mark final answer
4	Substitutes $y = 4$ and rearranges to correct 3-term quadratic $3x^2 - 2x - 1 = 0$ oe	**B1**	
	Solves *their* 3-term quadratic in x as far as $x = \ldots$	**M1**	
	$\frac{\mathrm{d}y}{\mathrm{d}x} = -2x^{-2} - 2x^{-3}$ oe, isw	**B1**	
	$\frac{0.01}{\delta x} = their\left(\left.\frac{\mathrm{d}y}{\mathrm{d}x}\right\|_{x=\ their\ 1}\right)$ or better	**M1**	**FT** *their* derivative and *their x,* providing *their* $x > 0$ and *their* $x \neq 4$ unless 4 is a genuine solution of *their* 3-term quadratic; must see a power decrease for attempted differentiation in two out of the three terms
	$-\frac{1}{400}$ oe as the only solution	**A1**	**dep** on all previous marks being awarded

Question	Answer	Marks	Partial Marks
4	**Alternative method** $x = \frac{1}{\sqrt{y}-1}$ or $x = \frac{1+\sqrt{y}}{y-1}$ or $x = \frac{-1-\sqrt{y}}{1-y}$ oe	**(B2)**	**B1** for $y = \frac{(x+1)^2}{x^2}$ or better or for $x = \frac{2+\sqrt{4-4(y-1)(-1)}}{2(y-1)}$ or for $x = \frac{-2-\sqrt{4-4(1-y)}}{2(1-y)}$
	$\frac{dx}{dy} = -\left(\sqrt{y}-1\right)^{-2}\left(\frac{1}{2}y^{-\frac{1}{2}}\right)$ oe isw or $\frac{dx}{dy} = \frac{(y-1)\left(\frac{1}{2}y^{-\frac{1}{2}}\right)-(1+\sqrt{y})}{(y-1)^2}$ oe	**(M1)**	or $\frac{dx}{dy} = \frac{(1-y)\left(-\frac{1}{2}y^{-\frac{1}{2}}\right)-(-1-\sqrt{y})(-1)}{(1-y)^2}$ oe
	$\frac{\delta x}{0.01} = \textit{their}\left(\left.\frac{dx}{dy}\right\|_{y=4}\right)$ or better	**(M1)**	**FT** *their* derivative ; must have attempted derivative
	$-\frac{1}{400}$ oe as the only solution	**(A1)**	**dep** on all previous marks being awarded

Question	Answer	Marks	Partial Marks
5(a)	$\frac{(5^4)^{\frac{x^3-1}{2}}}{(5^3)^{x^3}} = 5$ oe or $\frac{(25^2)^{\frac{x^3-1}{2}}}{\left(25^{\frac{3}{2}}\right)^{x^3}} = 25^{\frac{1}{2}}$ or $\frac{\left(\sqrt{625}\right)^{x^3} \times 625^{-\frac{1}{2}}}{125^{x^3}} = 5$ or $\log 625^{\frac{x^3-1}{2}} - \log 125^{x^3} = \log 5$ oe	**B1**	converts the terms given to powers of 5 or 25 or separates the power in the numerator correctly or applies a correct log law
	$5^{2x^3-2-3x^3} = 5^1$ oe $\Rightarrow -x^3 - 2 = 1$ oe or $25^{x^3-1-1.5x^3} = 25^{\frac{1}{2}}$ oe $\Rightarrow -0.5x^3 - 1 = 0.5$ oe or $\left(\frac{1}{5}\right)^{x^3} \times \frac{1}{25} = 5$ oe $\Rightarrow x^3 \log\frac{1}{5} = \log 125$ oe or $\frac{x^3-1}{2}\log 625 - x^3 \log 125 = \log 5$ oe	**M1**	**FT** *their* exponential equation in the same base or *their* logarithmic equation with any consistent base, **providing** *their* exponential or logarithmic equation has at most one sign or arithmetic error
	$[x =] \sqrt[3]{-3}$ oe or −1.442249... rot to 3 or more figs.	**A1**	mark final answer; not from wrong working
5(b)		**B2**	**B1** for correct shape; tending to $y = 3$ **B1** for shape with correct curvature and correct intercept of 7 marked or (0, 7) indicated